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Teaching Academic Skills

John McDonnell
University of Utah
Susan R. Copeland
University of New Mexico

The acquisition of academic skills is a significant predictor of the employment, citizenship, and community living outcomes achieved by students with disabilities following school (Benz, Lindstrom, Yovanoff, 2000; Phelps & Hanley-Maxwell, 1997). Although ecological curriculum frameworks for students with severe disabilities have historically recognized the importance of including academic skills as part of a student's educational program, they typically have emphasized the development of functional academic skills that have an immediate impact on a

student's ability to participate successfully in home, school, and community settings (Browder, 2001a; Ford, Schnorr, Meyer, Davern, Black, & Dempsey, 1989). Examples of functional academic skills that often overlap with a student's ecological curriculum include learning to count money to pay for purchases in stores or reading the sight words necessary to ride the bus. The No Child Left Behind (NCLB) Act of 2001 and subsequent amendments to the Individuals with Disabilities Education Improvement Act (IDEA) placed increased emphasis on the participation of students with severe disabilities in the general education curriculum, specifically in the areas of reading, math, and science. One of the challenges that currently face students, parents, and teachers is how to balance the need for students to learn academic content from both the general education curriculum and the ecological curriculum (see Chapters 3 and 6).

In this chapter, we will provide several guidelines that teachers can use to select appropriate academic skills for instruction and describe specific strategies for teaching reading, math, and science skills to students.

Before we begin, we'd like to introduce you to Marcus and Jacob. Their specific circumstances illustrate the wide range of academic skills that students with severe disabilities may need to learn. In addition, they highlight the various instructional approaches that teachers may use to provide effective instruction on academic skills to students.

Marcus

Marcus is a third-grade student in Mr. Garcia's general education class. Marcus has intellectual disabilities and requires extensive supports in order to participate in home, school, and community settings. He wears glasses that provide him with normal vision. His hearing is also within normal limits. Marcus communicates using speech, but his articulation problems make it difficult for new communication partners to understand everything that he says. Marcus receives most of his special education support within Mr. Garcia's classroom, but is pulled out for one period a day for extra work on literacy skills with Ms. Carter, a special education teacher. He also receives speech and occupational therapy services on a weekly basis, usually within his general education classroom. Mr. Garcia and Ms. Carter regularly meet to plan how to adapt and modify instructional activities to meet Marcus's learning needs and also to enlist the help of his speech and occupational therapists in order to design instruction that allows him to acquire key content information, but in a manner that aligns with his learning needs. Because Marcus's reading skills are at an emergent stage, he does best in learning academic content when instruction involves hands-on learning activities, individualized visual supports, and peers to model and explain activities. He has a small but developing sight-word vocabulary and is just beginning to use addition and subtraction in math. He needs many individualized modifications to the way that he receives content and the way in which he demonstrates learning, but with these in place, is acquiring some of the "big ideas" in the general curriculum. He especially loves working with peers in small cooperative learning groups and has developed some social and academic skills through these activities. For example, last week, the teachers selected the "big idea" from the upcoming science unit that they want Marcus to learn. They developed a hands-on small-group activity that allowed all of the students to discover some basic principles related to flotation. Marcus had a peer support within his group who helped him complete the steps of the activity for which he was responsible. When the group completed their lab log, another peer gave Marcus two choices for his assigned question (with pictures as visual supports) and asked him to select the choice that he thought was correct.

Jacob

Jacob is a junior at Canyon High School; he has autism. His school is on an "A/B" block schedule. He has several classes on one day and has different classes on the next day. Jacob is enrolled in a number of general education classes, including theater design and construction, computer technology, adult roles and financial literacy, and foods and nutrition. In the remaining periods, he receives support from his special education teacher Mr. Karst and Ms. Jackson, Mr. Karst's paraeducator, to learn personal management activities like shopping for groceries and leisure

activities like ice skating at the community recreation center. He also has a work-experience position at Smith's Food Center as a bagger. Jacob is able to participate in conversations with teachers and peers, but sometimes he perseverates on a topic and needs to be prompted to change the subject. He is able to read and understand simple stories, use the newspaper to get information about upcoming events, and access and use the internet with some support. Jacob is able to add and subtract with a calculator and he can reliably count bill and coin combinations (10s, 5s, and 1s). However, he has difficulty understanding if he has enough money in order to buy something that he wants, as well as developing a plan to save money for something that he wants.

SELECTING ACADEMIC SKILLS FOR INSTRUCTION

General Guidelines

A number of authors have argued that the expectations of parents, teachers, and administrators about the potential for students with severe disabilities to learn academic content have historically been low (Browder, Flowers, Ahlgrim-Delzell, Karvonen, Spooner, & Algozzine, 2004; Joseph & Seery, 2004; Katims, 2000a). In contrast, a growing body of research suggests that many students have the capacity to learn these skills when they are provided with systematic instruction and support (Browder, Spooner, Ahlgrim-Delzell, Harris, & Wakeman, 2008; Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006). IEP teams should not make assumptions about the capacity of students to learn academic content based on their classification or assessed level of cognitive ability. For example, in the area of reading, the student's classification and cognitive scores have less impact on that student's ability to learn sound–symbol relationships than do a student's short-term memory, modes of communication, and personal experience (Connors, Atwell, Rosenquist, & Sligh, 2001; Katims, 2000a). IEP teams should instead consider several more practical guidelines in developing appropriate academic goals and objectives for a student:

- *Select academic goals and objectives that build on a student's present level of performance in using symbols.* A critical factor in selecting academic goals and objectives for a student is how he or she will demonstrate mastery of the skill or concept being taught. Browder and her colleagues have suggested that there are three levels of symbol use, including presymbolic, concrete symbolic, and abstract symbolic (Browder, Ahlgrim-Delzell, Courtade-Little, & Snell, 2006; Browder, Wakeman, Flowers, Rickelmann, Pugalee, & Karvonen, 2007). Students at the presymbolic level use objects or gestures to communicate knowledge and understanding; those at the concrete symbolic level use symbols such as pictures, logos, and drawings; and students at the abstract symbolic level use symbols such as letters, words, numbers, and mathematical function signs to demonstrate mastery of skills and concepts. In considering the student's symbol use, the IEP team may develop goals and objectives that focus on (a) the student's current level of symbol use in instructional or daily living activities (e.g., using pictures to demonstrate understanding of content in history and science class, to locate items in the grocery store, or to monitor completion of job tasks at work); (b) expanding his or her use of symbols (e.g., learning to use new pictures in an instructional or daily living activity, or learning to apply known pictures in new instructional or daily living activities); and/or (c) teaching the student to use more complex symbols (e.g., identifying written vocabulary words in science or history, using a sight-word list to locate items in the grocery store, and monitoring completion of job tasks at work). Thus, the way that the student uses symbols will impact how the IEP team aligns IEP goals and objectives with the state's academic content and achievement standards, and the strategies that the students will use to complete routines and activities in the home, school and community settings.

- *Align content with the student's ability to perform successfully in current environments.* The academic content selected for instruction should contribute to students' current quality of life and personal autonomy. This requires that the IEP team conduct an ecological inventory and then consider the potential applications of academic skills in the environments in which students are expected to perform on a day-to-day basis. Research suggests that many students will have difficulty generalizing the skills learned in school settings to typical performance settings without explicit instruction (McDonnell, 2010). Consequently, goals and objectives should not only focus on the acquisition of academic skills, but also on the student's use of those skills in the routines and activities that the team regards as being a high priority. For example, a student might be taught to play a board game like *Trouble* with peers after learning to rational count ordered and unordered objects.
- *Align content with the student's long-term postschool goals.* While teachers are required under current federal law to select academic content that aligns with academic content standards, it is equally important to ensure that the skills selected for instruction contribute to the student achieving his or her long-term, postschool goals (Bambara, Wilson, & McKenzie, 2007). IEP teams need to carefully consider the information obtained from ecological inventories and/or ecological curriculum guides and evaluate how the academic skills selected as IEP goals and objectives will enhance the student's ability to work and live successfully in the community following school. This is especially important for high school and post–high school students who are transitioning from school to community life. For example, the skill of computing addition and subtraction programs using a calculator could contribute to a student achieving a number of employment, daily living, or leisure outcomes.
- *Select academic content that is suited to the student's chronological age.* The academic content selected for instruction should reflect the student's chronological age and grade level. Federal regulations require that the IEP team show how he or she will participate and progress in grade-level academic content standards that match his or her chronological age. When academic skills are selected from ecological inventories and/or ecological curriculum guides, the IEP team should ensure that the skills targeted for instruction will contribute to the student's performance of age-appropriate routines and activities.
- *Select academic content that has the potential to enhance inclusion in school and community settings.* Finally, the IEP team should consider whether academic content selected for instruction will increase the student's participation in the routines and activities of general education classes and the school. For example, learning to identify numbers could enhance a student's ability to eat lunch with his peers by allowing him or her to input a lunch code in the cafeteria. The same skill could help the student learn to use an automated teller machine (ATM) to get the money necessary to go to a movie with a friend.

Strategies for Developing Academic IEP Goals and Objectives

Achieving the intended outcomes for students who are participating and progressing in the general education curriculum requires that IEP teams ensure that there is a match among the state academic content standards targeted for the student, the adapted or extended academic content standards developed for the student, the alternate achievement standards identified to determine if the student is progressing toward proficiency on the adapted or extended academic content standards, and the instruction that the student receives (Flowers, Browder, Ahlgrim-Delzell, & Spooner, 2006). The most logical approach for achieving this alignment involves two steps: (a) using the IEP process to identify goals and objectives that are linked to the state's academic content standards and are structured to document a student's continuous

progress toward mastering the content, and (b) developing IEP goals and objectives that are focused on learning academic content that is not aligned to the academic content standards but nonetheless are necessary for the student to perform successfully in home, school, and community settings. Meeting both of these needs requires that IEP teams use a comprehensive approach for developing IEP goals and objectives that target academic content.

Three general strategies have been described in the literature for developing academic IEP goals and objectives for students. These include (a) the standard-based approach that adapts or extends the state's academic content standards to accommodate a student's needs and symbol use (Browder et al., 2007; Flowers et al., 2006); (b) the standards-referenced approach that seeks to link the skills selected from ecological inventories and/or ecological curriculum guides with the state's academic content standards (Hunt, McDonnell, & Crockett, 2012); and (c) the functional approach that selects skills from ecological inventories and/or ecological curriculum guides that will directly improve the student's ability to complete routines and activities in home, school, and community settings (Browder, 2001a; McDonnell & Hardman, 2010). The decision facing IEP teams is which strategy, or combination of strategies, they will use to identify appropriate academic content for students and develop IEP goal and objectives that can guide the instruction provided to students during the school year.

The Standards-Based Approach

Several procedures have been proposed for assisting IEP teams to adapt or extend a state's academic content standards so that they accommodate a student's learning needs and symbol use (Browder et al., 2006; Kleinert & Thurlow, 2001). Browder et al. (2006) suggests that the first step is to ask the general education teacher to identify the academic content standards that he or she would like all students in the class to master. For example, a third-grade general education teacher might identify the following standard from the state core curriculum—*Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers* (Utah State Office of Education, June, 2013)—as a priority standard for all students. Next, the IEP team adapts or extends the learning outcomes that are described by the standard so that they match the student's needs and ability to use symbols (i.e., presymbolic, concrete symbolic, abstract symbolic) (Browder et al., 2007; Kleinert & Thurlow, 2001). For example, instead of reading a text passage and answering written questions that require the student to predict what the main character will do next, the team might identify an alternate achievement standard that matches the student's ability to use symbols such as using pictures to predict what the main character will do next. The adapted or extended academic content standard and the alternate achievement standard provide the basis for the development of IEP goals and objectives that can guide instruction for the student.

The Standards-Referenced Approach

A second strategy for developing goals and objectives that are aligned with state academic content standards is to identify priority skills based on ecological curriculum frameworks and then to identify appropriate grade-level academic content standards that match the critical functions of the targeted skills (Hunt et al., 2012). For example, a third-grade student's IEP team may have agreed to target the communication skill of *Makes requests* as an IEP goal after completing the Choosing Outcomes and Accommodations for Children (COACH) guide (Giangreco, Cloninger, & Iverson, 1998). The next step would be for the IEP team to link this skill to the third-grade academic content standard in reading, math, or science. For example, after reviewing the state's academic content standards, the team determined that the skill *Makes requests* could logically be aligned to the state's third-grade reading/language arts standard *Ask and answer questions about information from a speaker, offering appropriate elaboration*

and detail (Utah State Office of Education, June, 2013). The IEP team would then identify an individualized performance outcome that reflected the critical function of the standards such as using three word phrases to request desired objects (Hunt, McDonnell, & Crockett, 2012). This outcome would provide the basis for a corresponding goal in the student's IEP.

The Functional Approach

It is important to remember that not all academic skills taught to a student must be based on or aligned with the state's academic content standards. Frequently, it will be appropriate for teams to develop additional academic IEP goals and objectives that are specifically designed to improve a student's performance in home, school, and community settings. With this strategy, the IEP team would use an ecological curriculum framework to identify priority routines and activities for the student and the academic skills necessary for them to successfully complete them (e.g., Browder, 2001b; Giangreco, Cloninger, & Iverson, 1998). Frequently, these academic skills will take the form of alternate performance strategies instead of the skills included in the state academic content standards. Alternate performance strategies are designed to simplify the cognitive, language, physical, or academic demands of routines and activities so that individuals who do not have these skills still can complete critical personal management, leisure, community, and work routines and activities. For example, an individual who cannot read could use pictures to locate items in the grocery store, or someone who cannot count money could take a large bill (e.g., $20 bill) to the store to pay for his or her purchases. With this approach, IEP goals and objectives are focused on the specific academic skills or alternate performance strategies that the student would need to learn to complete priority routines and activities.

DETERMINING THE INSTRUCTIONAL APPROACH

Once students' IEP goals and objectives have been developed, the next important decision that faces teachers is selecting the instructional approach, or combination of approaches, that will be used to teach academic skills to students. Several options are available: (a) teaching academics within the typical instructional routines and activities, (b) teaching academics in parallel instructional activities, or (c) teaching academics in community-based activities.

Teaching Within Typical Instructional Routines and Activities

Recent research has validated a number of strategies for teaching academic skills within the typical instructional routines and activities of general education classes (Hunt & McDonnell, 2007). Some of the most promising strategies include universal design (Dymond et al., 2006), cooperative learning (Hunt, Staub, Alwell, & Goetz, 1994), curriculum accommodations and modifications (Janney & Snell, 2013), peer-mediated instruction (Carter & Kennedy, 2006), student-directed learning (Wehmeyer & Agran, 2006), and embedded instruction (McDonnell, Johnson, & McQuivey, 2008). Together, these strategies provide the basis for an empirically validated instructional technology that can support instruction on academic skills in general education classes (see Chapter 5 for additional discussion of these strategies).

As part of his foods and nutrition class, Jacob is learning about the food pyramid and dietary guidelines published by the U.S. Department of Agriculture. His IEP team decided that it was important for him to learn to read the key words from the nutrition facts panel on the back of packages (e.g., total fat, carbohydrates, sodium, sugars) and state the recommended daily allowance for each item so that he can make

good decisions about the products that he buys at the store. To give Jacob enough practice in order to learn this content, Mr. Karst developed an embedded instruction program that included constant time-delay, reinforcement, and error correction procedures, and a data collection form. Mr. Karst then trained Carrie, a peer who sits beside Jacob in class, to implement the program. Mr. Karst developed three sets of flash cards that contain three of the words from the nutrition facts label. Jacob was asked to read the word and then state the recommended number of grams of each item that should be consumed daily. Mr. Karst asked Carrie to present each word set to Jacob two times during the class period at times that would not interfere with the ongoing activities of the class.

Teaching Academics in Parallel Instructional Activities

It is often possible to focus instruction for students with severe disabilities on the same learning outcomes within the same learning activities as their peers. However, sometimes students may need instruction on functional academic skills that only partially align with the objectives of the instruction for students without disabilities or they may need instruction on skills that are completely different from those of their peers. For example, students may need to receive instruction in the same curriculum domain but on different skills. A student might be taught to match times on a clock face to the specific times on the daily schedule during math class while his or her peers are learning to tell time to the minute. This has been referred to as *multilevel curriculum and instruction* (see Chapter 1). Another possibility is that students will need instruction on skills in other domains within the general education curriculum or skills selected from an ecological curriculum that are unique to the student's specific needs. For instance, during a shared reading activity that is focused on improving a student's oral reading, instruction for a student with severe disabilities might focus on learning communication skills such as labeling objects presented in the book's pictures or fine motor skills like learning to use a pincer grasp to turn the pages of the book. This is referred to as *curriculum overlapping* (see Chapter 1). In addition to the strategies discussed above, teachers can also use one-to-one instruction, small-group instruction, and computer-based instruction to teach students skills that are specific to their educational needs (see Chapters 1 and 6).

Teaching Academics in Community-Based Activities

Another approach for teaching academic skills to high school and post–high school age students is to embed instruction on these skills in community-based learning activities. Studies have shown that embedding instruction of academic content within community-based instruction improves students' performance of skills such as reading community signs, using photographic grocery lists to locate items within stores (McDonnell & Horner, 1985), reading prices, selecting coins for use in vending machines (Browder, Snell, & Wildonger, 1988) using the next-dollar strategy in stores and restaurants (McDonnell & Ferguson, 1988), and identifying numerals on an ATM (McDonnell & Ferguson, 1989).

One of Jacob's IEP goals is to purchase healthy food items at the two grocery stores located in his neighborhood. Jacob goes to each grocery store once a week for instruction. Part of Jacob's instructional program is designed to teach him to identify the nutritional words on the labels of different brands and compare the products on the basis of their nutritional value. For example, if Jacob's list includes strawberry yogurt, he would be asked to find two different brands (e.g., Yoplait® and Kroger), find the word "sugars" on each label, and identify the brand that has the least amount of sugar.

In addition to the absence of typical peers, one of the problems associated with only providing instruction in community-based settings is the limited number of instructional trials that are naturally available to students in order to learn a skill involved in completing an activity (McDonnell, 2010). For example, when a student is learning to purchase groceries, he or she will only have one natural opportunity during the session to pay for items. For most students, this will not be a sufficient number of instructional trials to result in efficient learning. One solution is to pair school-based instruction, either traditional tabletop teaching formats or computer-based video instruction, with instruction in actual performance settings (Branham, Collins, Schuster, & Kleinert, 1999). Although we do not know the best way to pair school-based and community-based instruction, the small number of studies that have been completed to date suggest that pairing school-based instruction with community-based instruction on the same day produces better generalization than other strategies, such as alternating school-based instruction and community-based instruction over successive days (Cihak, Alberto, Kessler, & Taber, 2004).

LITERACY INSTRUCTION

Definition of Literacy

How educators of students with severe disabilities define literacy is critically important. Educators' beliefs about what literacy is shape the content and structure of the instruction they provide to students (Keefe & Copeland, 2011). Historically, literacy has been defined as conventional reading and writing. There is a growing consensus in the field of severe disabilities that *literacy* should be defined more broadly to include obtaining meaning from printed materials, symbol systems, and other media. Recent research findings have demonstrated that students with severe disabilities are often able to achieve higher literacy skill levels than was once thought possible (e.g., Allor, Mathes, Roberts, Jones, & Champlin, 2010). There is also increasing recognition that literacy learning can continue over the life span rather than stopping after elementary school if a student has not become a conventional reader and writer (Moni, Jobling, Morgan, & Lloyd, 2011). These findings combined with mandates for *all* students to have instruction based on high academic standards (IDEA, 2004) support providing students with severe disabilities high quality, comprehensive literacy instruction.

Comprehensive Literacy Instruction

Individuals with severe disabilities vary widely in their skill levels. Some may be emergent literacy learners while others may be conventional readers and writers. Therefore, it is important to think flexibly and comprehensively when designing literacy instruction for them. Organizing instruction around the fundamental components of literacy is an effective way to design instruction. These components include oral language (expressive and receptive communication), word recognition (print or symbols), fluency, vocabulary and text comprehension, and writing (communicating a message using print or other type of symbols). Effective instruction should include instruction in each of these areas within each daily literacy lesson.

Teaching Emergent Literacy Skills

It is important to consider emergent literacy instructional practices before examining instruction for each specific component of literacy instruction. Emergent literacy includes reading and writing skills that will develop into conventional literacy (Sulzby, 1989). Students in this stage have not yet acquired full understanding of written language but are developing the foundational skills on which conventional

reading and writing skills will develop. Children's early literacy experiences have a considerable effect on their later literacy skill development. All children, including those with and without disabilities, acquire understanding about written language by being surrounded by printed materials, read to by adults, and having numerous opportunities to engage with print, such as by reading books and practicing writing using a variety of materials (Ricci, 2011). Students with moderate or severe disabilities may not have had the same early literacy experiences as their typically developing peers. This may be a result of various factors, such as parents placing literacy as a lower priority than development of other skills that they view as critical, or because of a lack of time or resources (Weikle & Hadadian, 2004). Additionally, students may have cognitive, sensory, or physical issues that impede their development of literacy skills. The result is that they may not develop the emergent literacy skills that are expected of typically developing young children, or students in this phase of literacy development may be much older than we would typically expect. Emergent literacy instructional practices are very useful in skill development for learners in this stage of literacy learning. It is important to remember, however, to adapt these practices for older learners to ensure that the materials and methods are age appropriate.

Emergent Literacy Instructional Practices

Providing a literacy-rich environment is one way that children acquire a basic understanding of print (written language) and how it relates to oral language (Ricci, 2011). A literacy-rich environment contains text, pictures, and graphics that are meaningful to the students in that setting. The teacher provides frequent opportunities for the students to communicate with peers and adults, interact with books and other engaging printed materials individually and in group activities, listen and respond to stories adults or peers read aloud to them, and experiment with writing and drawing about authentic topics that are related to their lives (Neuman, 2004). These activities provide students with meaningful and sustained interactions with their peers while engaging in authentic literacy tasks. An important characteristic of these activities is that they actively engage the student and are drawn from students' own experiences.

Read-alouds (sometimes called *shared reading* or *story-based lessons*) are a literacy practice in which an adult (or peer) reads to one or more students; this may include reading a familiar story (*rereading*). Students are often encouraged to retell the story or interact in other ways with the story during or after the read-aloud. Read-alouds are one way that emergent literacy learners can have access to quality literature and content knowledge and learn early literacy skills, such as acquiring concepts about print and developing deeper understandings of the way in which print maps spoken language. Read-alouds came from reading instruction for typically developing children, but have been successfully adapted by researchers so that students with severe disabilities can participate and acquire emergent literacy skills (e.g., Browder, Mims, Spooner, Ahlgrim-Delzell, & Lee, 2009; Browder, Wakeman, Flowers, Rickelmann, Pugalee, & Karvonen, 2007).

Katims (2000b) suggested a variation of read-alouds for both young children and older learners that is based on wordless books. Content in wordless books is represented almost entirely with pictures, making them ideal for use with learners with severe disabilities. Activities with wordless books develop (a) a knowledge of concepts about print, such as text features and meaning making from text and pictures; (b) vocabulary and expressive language skills; (c) listening comprehension skills, such as an understanding of narrative and story details, developing the ability to visualize, enhancing sequencing and prediction skills, and facilitating monitoring of understanding; (d) content knowledge (e.g., learning about the slave trade by reading *Middle Passage: White Ships, Black Cargo*, Feelings, 1995); and (e) writing skills (the ability to compose a message or story) (Katims, 2000b). Although many wordless

Box 13–1

Example of How to Create Wordless Book Activities, Including Resources for Wordless Books

Wordless Picture Book Activity

1. Select a wordless picture book that is appropriate for the group of students and the focus of the literacy lesson (e.g., the storybook called *Tuesday* [1991] to focus on prediction).
2. Work with the students in order to create a narrative (a story line) for the book. Begin by modeling this for several pages, stopping to ask the students questions or give prompts such as "What do you think happens next?"; "And then . . ." (allowing the students to fill in the blank); "When suddenly . . ."; "Finally . . .".
3. Write the students' suggestions on Post-it® notes and place these on each page, thereby keeping a record of the story that they create. Later, write the story on chart paper and have the students use this text for further word study (e.g., some students can identify letters, others words, others read the sentences). Students can type the handwritten text using computers and publish their stories.
4. Look for *teachable moments* during the activity in order to stop and discuss new concepts and vocabulary, and brainstorm *describing* or *action* words.
5. After students have become familiar with the process of "reading" wordless books, they can work in mixed-ability cooperative learning groups with other wordless books to create a story line. This is especially effective in inclusive classrooms where groups can include students with a range of literacy skill levels.

Follow-Up Activities

- Let the students "read" their favorite wordless books to a partner or to a younger child.
- Students might also want to create their own wordless book using the structure of the original text. For example, after reading and working with *Tuesday*, students might use the final drawing in the book as a springboard to create a book called *Next Tuesday*, featuring flying pigs.
- Plan an activity in which small groups of students use a digital device to take pictures and create their own picture books. Publish these and put them in the classroom library for children to read during Silent Sustained Reading (SSR).
- Work with the speech language pathologists to develop topics for books and related activities that will facilitate students' language skills.

Resources for Wordless Books

- See **www.houghtonmifflinbooks.com/features/harrisburdick** for examples of stories that children created after reading *The Mysteries of Harris Burdick* (Van Allsburg, 1984). The website also gives teachers ideas for using the book to develop students' writing skills.
- Creative Writing Through Wordless Picture Books (see **www.readwritethink.org/lessons/lesson_view.asp?id=130**)

Source: Adapted from Katims, 2000b

books have been written for young children, there are books available that are more appropriate for adolescents or adults. Some of these are informational texts that are especially useful when working with the Common Core State Standards (CCSS). Many of these books also lend themselves to creating instruction for students with and without disabilities. Additionally, with digital formats, it is easy to create interesting and age-appropriate sequences of pictures taken of students during classroom or community-based instruction or pulled from the internet. (Box 13–1 describes ways to use wordless books and provides resources.)

Teaching Conventional Early Reading and Writing

Evidence is accumulating that many students with moderate or severe disabilities can acquire the literacy skills needed to be conventional readers and writers (e.g., Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012). Although much remains to be learned about the reading process for this group of learners, teachers have a responsibility to offer students an opportunity to acquire literacy skills beyond functional literacy. This means providing instruction in early reading skills, as appropriate, for individual students. Browder and colleagues' *Early Literacy Skills Builder* (2009), a

published literacy program that focuses on comprehensive literacy instruction that utilizes the components of effective reading instruction (i.e., phonemic awareness, phonics, vocabulary, comprehension, and fluency) identified by the National Reading Panel (2000), is an example of emphasis on building the early reading skills of students with more significant disabilities. It is also important to recognize the critical role of language as the foundation for literacy. Although not discussed in this chapter (instead see Chapter 12), all students with severe disabilities should have opportunities to build language and communication skills. The next section describes research-based instructional practices in each of the component areas of literacy instruction with the exception of language and communication.

Word Recognition

Effective word recognition instruction includes learning both sight-word and decoding skills. Typically developing readers learn both types of word recognition skills and growing research (e.g., Allor, Mathes, Roberts, Jones, & Champlin, 2010) suggests that students with severe disabilities also benefit from instruction in both ways of recognizing words.

Sight-Word Instruction

Sight-word instruction, the method most often used to teach literacy skills to students with moderate or severe disabilities in the past, involves directly teaching the association between the word (or symbol) and the item or idea that it represents. Sight words are not limited to functional words or symbols. All beginning readers (with and without disabilities) receive instruction in sight-word recognition. This is because the English language contains numerous high-frequency words with irregular spellings that are easier for beginning readers to learn through memorization than by trying to apply their decoding skills. Building a strong sight-word vocabulary is critical for many students with severe disabilities because many of them will not acquire sufficient skills to make decoding a practical strategy for identifying words. It is also important to point out that building an initial sight-word vocabulary can form the foundation on which more complex skills can be built.

Selecting Words for Instruction

Selecting words for instruction is the first important step in teaching sight words. This is a particularly critical decision when teaching students with the most severe disabilities. Teachers must select these instructional targets with care so that the student learns the words that are most meaningful and useful to them. Thus, the words chosen will relate to the student's daily routines, academic activities, and preferences. For other students who are developing more conventional reading and writing skills, it may be helpful to select high-frequency words that will facilitate reading textbooks, stories, newspapers, and so on (e.g., the Dolch words, which are the most frequently encountered words in all kinds of reading materials).

An ecological approach to selecting words or symbols for instruction is helpful (Browder, 2001b). Teachers choose words that would improve the student's successful participation in current or future environments. The following considerations may be useful in selecting words for instruction. Select words that (a) are related to specific student interests (e.g., family members' names), (b) would increase access to the general curriculum and participation in classroom activities (e.g., classmates' and teachers' names; direction words; key content vocabulary, such as science or social studies terms) (e.g., Collins, Evans, Creech-Galloway, Karl, & Miller, 2007), (c) are found in the student's current environments (e.g., environmental print in the classroom or school), (d) are names of products that the student might wish to purchase (e.g., food or clothing products) (e.g., Mechling, Gast, & Langone, 2002), (e) would keep the student safe (e.g., walk/don't walk, exit), or (f) are related to the student's

employment (e.g., Minarovic & Bambara, 2007). Other important considerations are the student's age and home language, if different from English. Sections of some communities may have many signs written in languages other than English, and it may be important to the student and his or her family that he or she learns to recognize these community words.

Ms. Carter and Mr. Garcia created a list of sight words for Marcus that included some words suggested by his family that would increase his participation in home and community activities (e.g., favorite foods, the names of his brother and sister, and some safety words like "danger") and some key words in upcoming math, science, and social studies units (e.g., weather, cloud, ocean, add).

Instructional Methods

There are several well-supported instructional strategies for teaching sight words. The key for successful instruction is to carefully consider a student's learning characteristics and learning history before selecting a strategy and then monitor the student's progress in acquiring sight words and adjust instruction accordingly.

Response Prompting and Fading Procedures. Response prompts are the actions of a teacher prior to the student responding or after an incorrect response that help the student give a correct response (Browder et al., 2006). These may include verbal cues, gestures, modeling, or even full physical assistance (e.g., guiding a student's hand toward the correct word in an array of three choices). The teacher can give prompts before a student responds or prompts can be given after a student responds in the form of feedback or following error correction (e.g., "That isn't correct. The word is *menu*."). The response prompts provided by the teacher must be systematically faded if students are to read words independently. Strategies for fading response prompts include the system of least prompts, the system of most prompts, progressive time delay, constant time delay, and simultaneous prompting (Chapter 5 has a detailed explanation of how response prompting and fading procedures are used in instruction). Browder and colleagues (2006) conducted a meta-analysis of reading instruction research with individuals with significant disabilities and found that the use of response-prompt strategies had a very strong evidence base for both students with moderate and with severe disabilities.

Embedded Instruction. As more students with moderate or severe disabilities receive instruction in general education settings, it is important to utilize instructional strategies that match the learning needs of these students and do not stigmatize them or interfere with their participation in inclusive learning activities (Collins, Evans, Creech-Galloway, Karl, & Miller, 2007). Embedded instruction is a strategy that allows students with more extensive support needs to receive intensive, individualized instruction within the ongoing activities of the general education classroom (McDonnell, Johnson, Polychronis, Riesen, Jameson, & Kercher, 2006). Although it has been used successfully to teach a range of skills (e.g., picture naming skills, play skills, sight words, vocabulary), it is especially useful for helping students with severe disabilities in general education classrooms acquire core content words (e.g., Jameson, McDonnell, Johnson, Riesen, & Polychronis, 2007). General education teachers and paraprofessionals have all successfully implemented embedded instruction within general education settings (Johnson, McDonnell, Holzwarth, & Hunter, 2004). Research evidence also suggests that this method is as effective as massed trials instruction in teaching sight words to students with moderate or severe disabilities (Jameson et al., 2007; McDonnell et al., 2006). There is some initial evidence that indicates that students generalize information learned during embedded instruction to the typical materials used in the classroom (Riesen, McDonnell, Johnson, Polychronis, & Jameson, 2003).

Ms. Carter and Mr. Garcia selected four words in the current science unit to teach Marcus. They decided to use embedded instruction to teach the words because this method would not take Marcus away from routine class activities, yet it is very effective. Mr. Jones, the paraprofessional working in Mr. Garcia's class, had used embedded instruction to teach other students content vocabulary in the past, so the teachers asked him if he would work with Marcus on the science content words. Mr. Jones used a response-prompt procedure to teach the target words during the 10-minute time period at the end of the science block when students were to be putting away materials and getting ready to go to the cafeteria. He printed each word on a separate flash card and used constant time delay to teach Marcus to read and define each term. At first, he presented a card, read the word, and gave a simple definition before asking Marcus to repeat what he had modeled. Once Marcus was responding consistently with this simultaneous prompt, Mr. Jones presented the card and said, "Read the word and tell me what it means"; he then paused for three seconds. If Marcus didn't respond within the three-second delay, Mr. Jones modeled what to do and had Marcus repeat the information. If Marcus made an error, Mr. Jones corrected him and had him repeat the correct information. When Marcus responded correctly within the three-second delay, Mr. Jones increased it to five seconds. Within two weeks, Marcus could read and give a basic definition for each content word, whether it was printed on a flash card or on a science worksheet.

Stimulus Prompts. Stimulus prompts are another effective method for teaching sight words. With this strategy, changes are made to the words themselves that facilitate the student's learning. For example, a set of words may be color coded (e.g., *school* is written in green, *exit* is written in red) or a word may be placed within a picture that represents the word (or the picture placed within a word).

Although teachers often like to place pictures next to the words that they represent to help students acquire sight words (external stimulus prompts), research findings that compare this procedure with other instructional strategies suggest that students pay attention to the picture instead of the word when these are paired (Sheehy, 2002). Students make an association between the spoken word and the picture, not the spoken word and the printed word. Thus, when the picture is removed, students often fail to identify the word alone because they were attending to the picture and not the printed word. In essence, the picture blocks the student's attention to, and thus identification of, the word (Didden, Prinsen, & Sigafoos, 2000).

Despite these cautions, researchers have found several effective methods for transferring stimulus control from the prompt (e.g., a picture superimposed over a word) to the printed word. *Stimulus fading* is a procedure in which the stimulus prompts are gradually reduced in size or intensity. In teaching sight words, this means that the picture cue is gradually faded over instructional sessions until only the word itself remains. Figure 13–1 demonstrates this strategy. This technique has been referred to

FIGURE 13–1
Stimulus Fading to Teach Sight-Word Recognition with Each Box Representing Increased Fading of the Stimulus Prompt

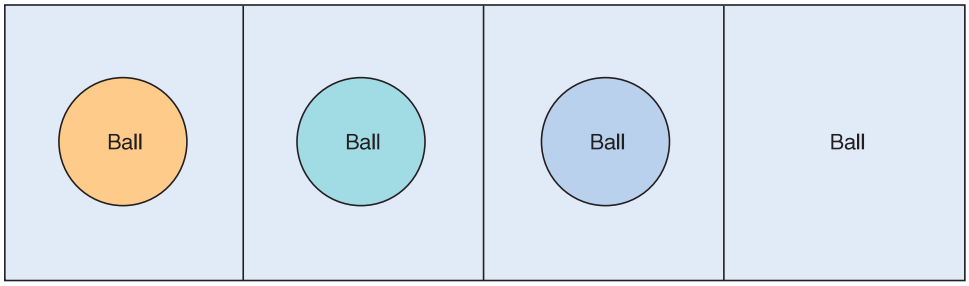


FIGURE 13–2
Example of Stimulus Shaping to Teach Sight Words: Learning to Recognize the Word Book.

The teacher begins Trial 1 by showing the first row (blocking out the remaining rows with a piece of paper) and asking the student to point to *book*. In Trial 2, he or she shows the second row and asks the student to point to *book*. The teacher repeats this request with each row. The number of distracter words gradually increases, requiring the student to make increasingly more difficult discriminations among the words.

Trial 1	–	book	–
Trial 2	book	–	–
Trial 3	ball	–	Book
Trial 4	–	book	ball
Trial 5	boat	ball	book
Trial 6	booth	book	boat

using many different terms, such as *embedded picture prompts, integrated picture mnemonics* (e.g., de Graaff, Verhoeven, Bosman, & Hasselman, 2007), or *picture fading* (e.g., Didden, de Graaff, Nelemans, Vooren, & Lancioni, 2006). Research has demonstrated its effectiveness in teaching letter sounds and sight words to children with moderate or severe intellectual disabilities (e.g., Sheehy, 2002) and to typically developing children (e.g., de Graaff et al., 2007). *Picture Me Reading* is a commercial reading program that is founded on the use of stimulus prompts. The challenge for the teacher lies in the preparation of the materials.

Stimulus shaping is another instructional method used successfully to teach sight words to students with moderate or severe disabilities. With this strategy, the target words remain unchanged, but the number and type of distractor words presented with them are gradually changed. This requires that the student make increasingly fine discriminations in selecting/reading the target word. Initially, a target word may be presented by itself; then it may be presented with a distractor word that is very different from the target word. Another distractor word that is more similar to the target may then be added and so on. The *Edmark Reading Program* is a published sight-word reading program that is founded on this instructional strategy. Figure 13–2 shows an example of this type of teaching strategy.

Promoting Generalization of Sight Words

It is important when teaching sight words to aim for generalization. Too often students acquire sight words in the classroom but cannot recognize those words in other settings at school, at home, or in the community or in connected text (Alberto, Waugh, & Fredrick, 2010). Using strategies such as *teaching with multiple exemplars* can enhance generalization. Multiple exemplars are examples that contain the critical stimulus or response features that students should pay attention to when learning a new skill. Teaching students to respond correctly to a range of relevant examples (stimulus exemplars) increases the probability that the student will be able to read the targeted word in the natural environment that contains all of the various ways that the word can be written or displayed. Teachers who use this method select a variety of teaching materials, being sure to vary both the relevant and irrelevant dimensions of target words so that students learn to recognize the words regardless of the font, size, or color used (e.g., that, that) or the type of text (e.g., a word printed on a card, on a sign displayed in the hallway, or on a restaurant menu).

Target words should also be taught in a variety of settings, not simply in the classroom, so that students learn to recognize the words no matter where they are encountered. *General case programming* is a generalization strategy that educators can use to teach students to transfer sight-word learning across settings. This

teaching method utilizes multiple teaching examples that sample the range of relevant stimulus situations and response variations. For example, teachers show the words printed in various fonts and sizes, and within varied texts, and ask students to respond in different ways (e.g., verbally reading a word, pointing to a word, or responding to a word). The instructor teaches these examples in various settings, across various persons, and within various activities. Mechling, Gast, and Langone (2002), for example, taught four school-aged students with moderate disabilities to identify grocery words on aisle signs and to locate the items represented by the words using a computer-based video program that incorporated video and photographs of overhead aisle signs from three grocery stores that were frequented by the students' families. After computer-based video instruction and multiple probes within the actual stores, students were able to successfully generalize their word-reading skills to locate items in a novel store.

Marcus's parents reported to his teachers that although Mr. Garcia said that Marcus had learned 10 new community sight words since school began, Marcus wasn't recognizing those words when he encountered them at home or in the community. Ms. Carter suggested that the staff reteach the words, but this time, instead of using response prompting with one set of flash cards to teach the words, they would create and use several sets of cards, written in different fonts, sizes, and colors. She also created several simple stories, using different fonts that incorporated the target words so that Marcus could practice reading the words in connected text. She asked a peer in Marcus's classroom to do a word treasure hunt with him. Marcus and Kate walked around the school, pausing in front of signs that Marcus was learning to read (e.g., "school office," "exit," "enter"). Kate asked Marcus to read each sign as they came to it and helped him check off a box if he read it correctly. If he checked off all of the boxes, he and Kate got to have a treat when they returned to the classroom. After a couple of weeks of these activities, Marcus's mom called to say that Marcus had correctly (and proudly) read the "enter" and "exit" signs at the mall over the weekend.

To be truly functional for the student, sight-word instruction must extend beyond merely learning to name words or symbols. This is accomplished by teaching *comprehension of target words* from the start of instruction. Instruction can include simple activities such as matching words to pictures or items, or being shown a word and asked to locate that item (e.g., being shown the word *cafeteria* and asked to find what it represents). It is also critical that students be taught to recognize and comprehend words in connected text if at all possible. For example, the teacher can construct simple two- and three-word sentences using the high-frequency or functional words that students are learning and have students practice reading these sentences and demonstrate comprehension of their meaning. This is especially appropriate for high-frequency words whose meanings may be very abstract unless they are taught within the context of a sentence (e.g., *of, and, that*). Even functional sight words, such as safety words, are most effectively taught when students learn what the words mean and the appropriate responses to such words (e.g., *exit*). Alberto, Waugh, and Fredrick (2010) used systematic instruction to teach five middle school students with moderate or severe disabilities to successfully transfer single word reading to short connected texts. In addition to reading the connected text, students also demonstrated comprehension of what they read.

Instruction in Phonological Awareness and Phonics

Phonological awareness (PA) is the ability to recognize and manipulate the sounds in words (e.g., the ability to hear rhymes and segment syllables, and hear and manipulate individual sounds within words [phonemic awareness]). Children who are aware of the sound structure of language are better able to understand the alphabetic principle (i.e., understand that speech sounds can be represented by symbols and written down and read by themselves and others) (Torgeson & Mathes, 2000).

Although there is less research on PA with children with more severe disabilities than with typically developing children, the research available suggests that just as with typically developing children, strong PA is linked with stronger reading abilities (Saunders, 2007).

Phonics is related to, but is not the same skill as, PA. *Phonics* is the association between the sounds in a language and the letter(s) that represent the sound. Application of phonics skills to decode words requires both short-term memory and skill in manipulating sounds. To accurately decode the word *ball,* for example, a student must first isolate the individual sounds in the word (/b/, /a/, /l/), hold these in short-term memory, and then quickly blend the sounds back together to represent the word. These demands on auditory memory can be difficult for students with severe disabilities. Nevertheless, learning at least some decoding skills allows an individual to read novel words instead of relying solely on words in his or her sight vocabulary (Saunders, 2007). Research shows that more students with severe disabilities are capable of learning and applying more decoding skills than was previously thought possible (e.g., Browder, Ahlgrim-Delzell, Flowers, & Baker, 2012). Teachers and teams must thoughtfully consider which instructional outcome would best serve an individual student by increasing his or her active participation in family, community, school, and employment settings.

Phonics skills have been taught using an assortment of strategies (e.g., picture cues, response prompts, modeling, and published reading programs). Cohen, Heller, Alberto, and Fredrick (2008) used a constant time-delay process to teach five students with mild or moderate intellectual disability (ID) to use a decoding procedure to read consonant–vowel–consonant (CVC) or consonant–vowel–vowel–consonant (CVVC) words. They taught students to (a) point to the target word, (b) slowly say each sound in the word, and (c) say the sounds in the word quickly (in order to blend them). All students learned the three-step procedure and were able to successfully decode the 12 target words, although the last step (blending) was the most difficult for them to master. The students who demonstrated the strongest decoding skills had the highest scores on a measure of phonological awareness, thus adding to prior findings that strong phonological memory is associated with stronger decoding skills.

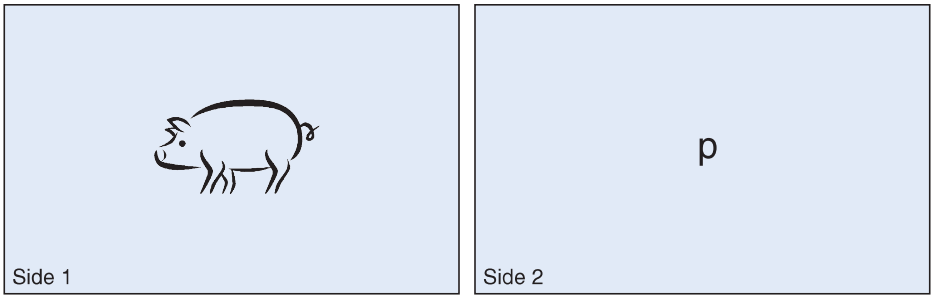
Other researchers have utilized a published reading program based on systematic, explicit instruction to successfully teach decoding skills to students with moderate or severe disabilities. Bradford and colleagues (2006), for example, effectively used a direct instruction program to teach three students with moderate intellectual disabilities sound–letter correspondences, decoding words, and reading words in sentences and short paragraphs.

Sixteen elementary school students with moderate ID randomly assigned to a treatment group that received comprehensive literacy instruction (including explicit phonics instruction) showed significantly more growth in phonemic awareness and phonics skills, word recognition, and vocabulary and comprehension than students in the contrast group (Allor et al., 2010). The intervention program utilized systematic instruction paired with engaging, repetitive instructional activities.

Morgan, Moni, and Jobling (2006) described a phonics instruction program for young adults with intellectual disabilities that included explicit instruction within instructional activities based on the students' interests and prior experiences, as well as their current abilities and skills. Some of the instructional activities within this program included creating alphabet books based on student interests (e.g., animals), using cards with ending sounds (e.g., rhymes) to foster word recognition and develop writing vocabulary, and using cooking activities (a student's interest area) to extend knowledge of letter–sound correspondences and facilitate writing skills.

What seems to be important across these studies is that phonics instruction for this group of learners be systematic and explicit; that it begin early in a student's schooling; that it include instructional activities that require active participation using game-like activities, manipulatives, and other instructional formats that promote dynamic

FIGURE 13–3
Sound Cards Illustrating Initial Sound of /p/ Students can match letters to picture cards, sort pictures by beginning sounds, or play an "odd one out" game in which four picture cards, three of which begin with the same sound and one of which begins with a different sound are displayed. The student selects the picture that does not begin with the same sound.



(Source: Based on Morgan & Moni, 2005.)

student involvement; and that it be sustained. Allor et al. (2010), for example, found that students with moderate ID required intensive structured instruction across a long time period to make substantial gains in literacy skills (one to one and a half years). Figures 13–3 and 13–4 show examples of using visuals to teach letter–sound correspondences in a game-like format.

Ms. Carter used response prompts and visual cues to teach Marcus the letter–sound correspondences for five initial consonant sounds and two short vowels. She is extending his learning by helping him create "sound books" for each of the letter–sounds that he has mastered. She provides an array of three pictures of some of his favorite things and helps him select the picture that begins with the targeted sound. He then glues the picture into his book and writes (or copies) the label for the picture, highlighting the targeted letter. Marcus shares his books with the kindergarten students that his class tutors each week, reinforcing their letter–sound knowledge, and takes his books home to read to his family.

FIGURE 13–4
Visual Support for Teaching Letter/Sound Correspondence Students place a letter card first in the "sound" pocket and make the sound of the letter. Next, they place it in the "letter" pocket and state the name of the letter.

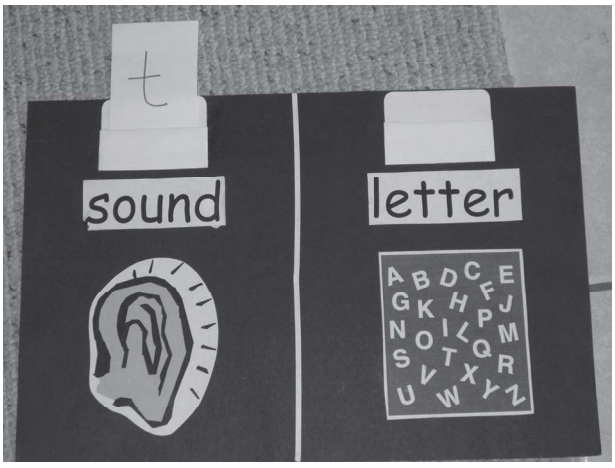


Photo: Susan Copeland

Spelling

Like other areas of literacy instruction, students with moderate or severe disabilities have not always received instruction in spelling (Vedora & Stromer, 2006). Learning to spell (i.e., encode) facilitates literacy skills in other areas (e.g., decoding) and extends written communication with others (Heron, Okyere, & Miller, 1991; Vedora & Stromer, 2006). Heron et al. (1991) described three general instructional approaches for teaching spelling. These included a linguistics approach that is founded on the teaching of the phonological and morphological aspects of written language; a remedial approach founded on methods such as the Fernald technique, the Gillingham–Stillman method, the Horn method, and a phonovisual method; and a series of approaches that are primarily modifications of the other methods, such as teacher modeling, constant time delay, teaching spelling rules, using distributed practice and interspersion of unknown words, and copy–cover–compare. Some of these later approaches have been used to teach spelling to students with more significant disabilities. Combining systematic instructional procedures with new technologies also offers some promise in creating effective spelling instruction. Purrazzella and Mechling (2013), for example, used a small group setting to teach three young adults with ID to spell six grocery words. Students saw a picture of each item accompanied by the printed word projected on a large screen. Using a forward-chaining procedure, students copied the correct spelling on their tablet PC using a digital pen. One letter at a time in the projected text was eliminated in subsequent trials until no letters were left, requiring students to print the missing letters from memory. Results showed that all students learned to spell their sets of words and were able to transfer their spelling of these words to a paper and pencil grocery list. All of the students also learned to spell at least 50% of their peers' word sets.

Vocabulary Development

Vocabulary development is strongly related to the ability to read and is often an area of need for students with moderate or severe disabilities. Having a strong vocabulary contributes to increased reading comprehension and, at the same time, reading and encountering new words is an important way in which vocabulary development occurs. Research indicates that instruction in vocabulary improves students' word knowledge and also improves reading comprehension (Browder et al., 2006).

Students' vocabularies are composed of words that they understand and use in four different but related areas: listening, speaking (or using augmentative forms of communication), reading, and writing. Each vocabulary area affects a student's literacy abilities so it is important to systematically develop all four areas through instruction (Keefe, 2007). Just as with selecting sight words for instruction, it is useful to utilize an ecological approach to select words for vocabulary instruction. Words should come from the home, school, and community environments, as well as vocabulary from the general curriculum, which facilitates access to content knowledge (Keefe, 2007).

Effective vocabulary instruction, according to the National Reading Panel (2000), relies on a number of approaches: (a) direct instruction *and* context to teach word meanings, (b) incorporation of multiple forms of media during teaching activities, (c) utilization of methods to enhance the association between new words and words that are already in a student's vocabulary, (d) opportunities to practice words to automaticity and to use them in multiple contexts, and (e) incorporation of active student response. Research on instructional strategies used to teach vocabulary to students with moderate or severe disabilities has examined several methods, each of which were successful: (a) embedded instruction (e.g., McDonnell et al., 2006), (b) response prompts and time delay (e.g., Collins et al., 2007), (c) computer-assisted instruction in order to teach sight-word meaning (e.g., Mechling, et al., 2002), and (d) peer tutoring (e.g., Kamps, Locke, Delquadri, & Hall, 1989). Figure 13–5 shows an example of a vocabulary activity utilized in an inclusive classroom and adapted for students with severe disabilities.

FIGURE 13–5
Example of a Vocabulary Activity Target words were selected from a book the class read together. The teacher taught the word meanings using various strategies and created color-coded fill-in-the-blank worksheets. She typed the target words on file labels (color-coded) and asked the students to select the correct word for each blank. Students who couldn't write the words could peel and stick the labels containing the color-coded vocabulary words.

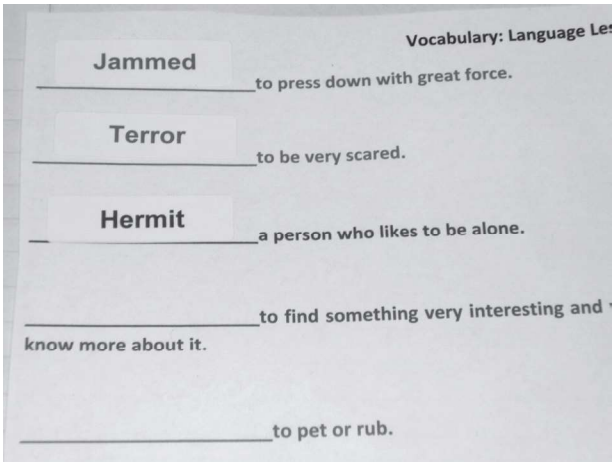


Photo: Susan Copeland

Reading Comprehension

The goal of reading instruction is to understand what is read. Understanding must be taught from the beginning of instruction. Many experts suggest that, since there is limited research on developing reading comprehension in students with significant disabilities, teachers utilize instructional strategies found to be effective with typically developing learners, taking into account students' current levels of literacy skills (Browder et al., 2006).

Reading comprehension for some students with severe disabilities involves understanding the meaning of single words or symbols. (Strategies to enhance sight-word comprehension were discussed in a prior section.) Other students can work with connected text, even if it is only short sentences. Comprehension of connected text is a complex and active task that requires (a) recognizing and understanding the meaning of the individual words in the text; (b) activating any prior knowledge about the topic of the passage (i.e., relevant background knowledge) and knowledge of text structure; and (c) applying these skills to the text to facilitate comprehension while (d) constantly monitoring understanding to make the necessary understanding "repairs" if something doesn't make sense (Copeland, 2007a). Given the complexity of the task, it is not surprising that students with moderate or severe disabilities have difficulty with comprehension because they likely have difficulties with several of these four component skills. Effective instruction for these learners generally must include intervention in several areas of reading, such as working on underlying language difficulties *and* teaching specific strategies to use to facilitate comprehension.

It is useful to organize reading comprehension instruction according to strategies that target the before, during, and after phases of reading a text because there are specific tasks that successful readers utilize during each of these points in the reading process (e.g., Ehren, Lenz, & Deshler, 2004). One effective *before-reading* strategy is setting a clear purpose or goal for reading. Individuals read for many different reasons and read many different types of texts (e.g., textbook, novel, grocery list). It is

essential to use different kinds of texts during reading instruction and to use strategies such as *think-alouds* (i.e., using self-talk to set a purpose for reading) to teach students to actively reflect on why they are reading a particular text. This helps students understand why they are engaging in the activity and how it relates to their interests or experiences (e.g., *We are reading a recipe today so that we can learn how to make a sandwich.*). An *after-reading* activity that is linked to the purpose makes this strategy even more effective. For example, making a sandwich and sharing it with a friend is a logical and engaging activity to follow the reading of a recipe. Pictures taken of the activity can be arranged in a wordless book (or digital book) and used to reinforce target reading objectives.

Activating prior knowledge and predicting are also effective *before-reading* comprehension strategies. The National Reading Panel (2000) found strong evidence for using questions (i.e., *wh* questions) to activate prior knowledge and predict. Morgan and colleagues (2004), for example, taught six young adults with ID to improve their comprehension by using question words to access their prior knowledge and experiences before reading and then using prediction to help them make connections between their knowledge and experience and the stories being read.

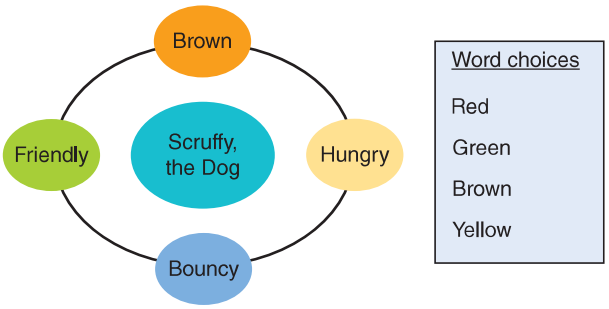
There are a range of comprehension strategies that teachers can use *during reading* to help students monitor their comprehension. An example is an adapted maze exercise in which a text passage has blanks inserted at regular intervals and word choices listed beside the blanks to assist students in monitoring their comprehension as they read. Stopping to select a word (either by circling it, writing it in a blank, or pointing/using eye gaze) prompts students to think about the meaning of what they are reading so that they can make a word choice that makes sense (Copeland, 2007b). Foley and Staples (2007) suggest stopping students during reading to generate questions about the text that can then be put on sticky notes and examined later. They also suggest using graphic organizers such as KWL charts to organize information and events within the text: (a) what I already *know* about a topic, (b) what I *want to know* about the topic, and (c) what I *learned* after reading about the topic).

Mr. Karst works with each of Jacob's general education teachers to identify the key concepts or terms that he needs to understand in each unit and for each reading assignment. In addition, he asks the teachers to identify several questions that they would expect students in the class to be able to answer after reading the assignment. Mr. Karst's paraeducator creates an audio recording of each reading assignment so that Jacob can follow as he reads it at home. Mr. Karst then develops a guide for Jacob for each reading assignment that includes a list of the key concepts or terms that he needs to understand. He reviews each guide with Jacob before he goes home. Jacob uses the guide to identify the concepts or terms as he reads and then writes an explanation of the concept or a definition of the term in his own words. Mr. Karst reviews the guide with Jacob the next day and asks him the questions provided by his general education teachers to ensure that he clearly understands the material.

Story retellings (Allor et al., 2010) and teaching story grammar (Katims, 2000b) are among the various comprehension strategies for *after reading* that have been used effectively with students with intellectual disabilities. The teacher can give picture cards to students to use in retelling activities to decrease the expressive language demand. For example, a student can select a picture from an array that represents the main idea of a short passage, or arrange a series of pictures that depict story events in the sequence in which they occurred.

Marcus and his peers in Mr. Garcia's class have been practicing recalling major points in a text and making and modifying predictions about forthcoming information. With Ms. Carter's help, Mr. Garcia has taught everyone in the class to use story grammar maps while they are reading in order to record key details from the stories and to make predictions. Marcus does not yet have sufficient reading skills to read a

FIGURE 13–6
Example of a Story Map Focused on Character Traits Marcus filled in the story map as he read with peer support, using word choice boxes such as the one to the right to select words representing important details about the dog in the story.



story independently, so Mr. Garcia has assigned him to work with a peer. The peer reads a story written at Marcus's listening comprehension level. He stops periodically to ask Marcus about details from the story and together they record these on a story map. Marcus participates by recalling details and events, and by selecting words that he can read from a choice pool to fill in the details on the story map (e.g., color words to describe the color of the dog in the story; see Figure 13–6). He is also learning to make predictions about what he thinks will happen next in the story. When they are done, Marcus retells the story to his peer support who prompts him if he forgets an essential event. Marcus then draws a picture to represent the main events in the story and this, plus the story map he worked on with his classmate, is turned in to Mr. Garcia.

Fluency

Fluency is the ability to read words accurately and at an acceptable speed, using appropriate intonation and text phrasing (Keefe, 2007). There is little research on fluency among students with moderate or severe disabilities (Allor & Chard, 2011). Two recent studies illustrate what is known from the scant research findings in this area. Coleman and Heller (2010) examined the effect of an instructional package on the reading fluency of four elementary school students with physical disabilities, two of whom had mild cognitive disability. The intervention components included repeated reading with computer modeling, error correction, and graphing students' progress. All the students demonstrated increased fluency and comprehension across readings of the same text, but only three of the participants demonstrated any transfer of fluency gains to novel texts. Heller and colleagues (2007) examined and compared the effects of repeated readings with corrective feedback and paired reading (these authors called it *unison reading*) on the fluency of two elementary students with physical disabilities. Both students demonstrated higher rates of oral reading fluency after being provided with multiple opportunities to read a passage at their instructional level and receiving corrective feedback. Adding more reading repetitions (up to five more with one student) clearly increased student fluency rates. Adding unison reading as an intervention component was more effective than repeated readings and error correction alone, although this was examined with only one student. The researchers stressed that when teaching fluency to students with physical disabilities, teachers must provide appropriate adaptations that allow maximum access to the reading materials, including taking into account positioning needs and changes to materials such as increasing the font size.

Writing

Reading and writing are reciprocal processes: Acquiring reading skills enhances writing skills and vice versa (Staples & Edmister, 2012). Being able to write has important social implications as well, because creating written texts is a form of communication that can increase participation in school, community, and vocational settings. The modest research available on writing instruction for students with moderate or severe disabilities suggests that although it is an important part of a comprehensive instructional program, schools do not provide as much instruction in this critical area as in other aspects of literacy (Staples & Edmister, 2012). Students with severe disabilities may encounter difficulty in learning to communicate in written form both because of their unique learning characteristics and because they may not have had expert, explicit, sustained instruction that took into account their unique learning needs. However, learning to compose written text has several advantages for these students, including that written texts are permanent and can be revisited numerous times in order to increase understanding of the content of the text, as well as reorganized and revised in order to increase the clarity of its message (Sturm, 2012).

Sturm (2012) states that writing, "allows individuals to engage in authentic communication with themselves and others to express basic and abstract ideas" (p. 336). Van Kraayenoord and colleagues (2004) emphasize that writing "involves constructing meanings by choosing and arranging symbols and understanding how these meanings change as a result of audience, context, and purpose" (p. 36). This broader interpretation of writing allows the inclusion of text composed of letters and words, pictures, graphics, or any combination of these.

Mr. Garcia knew that learning to compose written text is an important component of literacy instruction, but he was struggling to find ways to help Marcus with this area of literacy. He and Ms. Carter met to do some brainstorming. They came up with several ideas that they implemented over the next month. First, they created several options for Marcus to choose from during journal writing in the morning. Marcus now can choose to dictate what he wants to say on a topic to a peer support. His peer support prints what Marcus says and reads it back to him to check if that is what Marcus wants to say, being sure that she runs her finger along the print as she reads it back. This helps Marcus develop his understanding of the concept of word, as well as deepening his understanding that print represents spoken language. Marcus can then use the computer to copy the entry or can copy it by hand to turn in. Another option that Marcus can choose for journal writing is to complete sentence frames using a word bank. It might say something like "I am going to _____ for Thanksgiving. I will get to eat _____." The word bank contains word choices that are also supplemented with pictures (e.g., the word turkey has a small picture of a turkey printed next to it). Marcus selects a word and copies it onto the frame. He can work on this independently or he can ask a peer to assist him.

Mr. Garcia has taken these ideas of how to create access to composing text and has used them in other content areas throughout the school day. For example, in social studies, he has given Marcus a sentence frame summary to complete using a word bank of key content words supplemented with small pictures. He is also helping Marcus to create a book of stories that Marcus will publish and give to his parents as a holiday gift just as his classmates are doing. Mr. Garcia often helps Marcus get started on writing these by showing him pictures of things that Marcus is interested in or places Marcus has visited. He asks questions and copies down Marcus's answers. He then helps Marcus think about how to say what he wants and copies down his words onto a white board so that Marcus can see his spoken words represented in writing. Mr. Garcia reads the text back, being sure to let Marcus make revisions if he decides he wants to make a change in a word or add something. This process of writing and revising is helping Marcus to better understand how to communicate his thoughts and is helping him learn basic aspects of

FIGURE 13–7
Adapted Journal Writing Using Symbols Instead of Words Students who don't write can select a picture symbol from the right side of the page to use in completing their fill-in-the-blank journal entries.

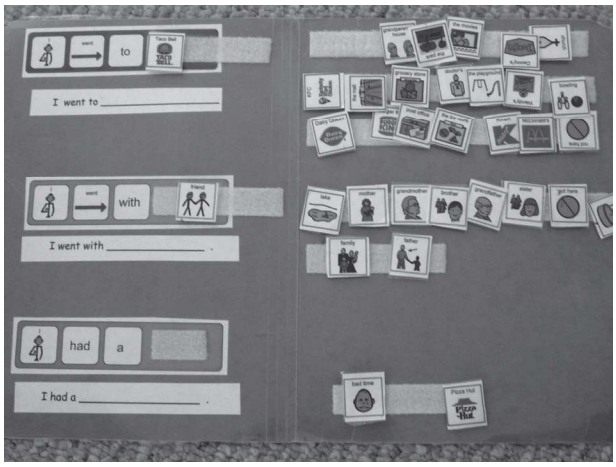


Photo: Susan Copeland

writing, such as punctuation. Marcus uses the computer to type his story (copying from Mr. Garcia's printing), he chooses pictures or graphics to illustrate his story, and he finally prints it out to include it in his book.

Effective writing instruction for students with severe disabilities begins with high expectations that students have something to say, providing numerous opportunities to utilize writing throughout the school day, selecting writing topics and purposes that are meaningful to the students, and providing the supports that many of these students require in order to express themselves by written means (e.g., specialized keyboards, assignments adapted to allow for the use of symbols or graphics instead of writing with letters) (Copeland, 2007b). Some specific instructional methods examined in research have included strategy instruction (e.g., Bedrosian, Lasker, Speidel, & Politsch, 2003; Konrad, Trela, & Test, 2006), computer-based instruction (e.g., Yamamoto & Miya, 1999), using the Four-Blocks literacy format (e.g., Hedrick, Katims, & Carr, 1999), and learning to compose a message using text/symbols (e.g., Foley & Staples, 2003). Figure 13–7 shows an example of a journal writing activity adapted for students who could not write and instead selected picture symbols to complete the journal prompts.

Sturm (2012) described an instructional approach to writing for students with severe disabilities that incorporates both process and cognitive strategy instruction. The Enhanced Writer's Workshop includes brief (5–10 minutes) teacher-led lessons focused on one writing-related skill, opportunities to engage in independent writing on self-selected topics given individualized supports and adaptations, and an opportunity to share one's writing with peers and the teacher. Pilot data indicate that students with significant communication, cognitive, and motor challenges who participated in these workshops made substantial gains in communication and early writing skills.

Selecting appropriate and engaging writing tasks is an important part of effective writing instruction. It is important to choose writing topics and activities that are meaningful to students (Copeland, 2007b). Tasks that are based on shared experiences, such as field trips or class projects, are examples of creating instructional opportunities that are meaningful to students and that increase their participation in their classroom and school. The teacher can create a folder or bulletin board of pictures or photographs of class trips, preferred activities, and other meaningful topics from which

students can select writing prompts. Other possible writing activities include creating books and poetry through shared writing activities (e.g., Kahn-Freedman, 2001) or using a language experience approach to write stories or other texts (Katims, 2000b).

Handwriting

Handwriting (i.e., letter formation) requires fine motor skills, visual acuity, spatial and sequential ordering, and visual and kinesthetic memory (Rosenblum, Weiss, & Parush, 2003). Many students with severe disabilities struggle with handwriting because of their difficulties with these component skills, yet learning to write has many functional uses so it is an important area for instruction. Some researchers (e.g., Graham, Harris, & Fink, 2000) have linked handwriting to broader writing skills (e.g., composition), further indicating its importance in a literacy curriculum.

Students should have systematic instruction in handwriting and functional opportunities to practice writing within meaningful activities throughout the day (e.g., putting their name on the papers they turn in) (Graham et al., 2000). Students must be properly positioned before beginning instruction and have any adapted materials that they might need, such as a slant board, adapted writing implements and grips, and appropriate paper (e.g., paper with larger-sized manuscript lines or paper that contains raised lines in order to provide an additional tactual cue for where to begin or end a letter). An occupational therapist can be an invaluable resource for determining what materials might be most helpful to a student. Effective instruction includes the teacher or a peer modeling correct letter formation, students tracing and copying letters and words, and teachers or peers providing feedback to students (e.g., praising correct letter formation and requiring students to revise incorrectly formed letters). Batchelder, McLaughlin, Weber, Derby, and Gow (2009), for example, used hand-over-hand prompting and dot-to-dot tracing to help an adolescent with intellectual disability and autism learn to write the letters in his name. (See Figure 13–8 for an example of dot-to-dot tracing materials.) There are also a number of commercial programs available to teach handwriting that can be very helpful (e.g., *Handwriting Without Tears*® [Olsen, 2010]).

Foley and Staples (2007) point out that for students who struggle with the physical act of handwriting, so much energy and attention is focused on forming letters that the student may have few cognitive resources left over to do the critical tasks of composing what he or she wants to say. For students for whom handwriting is not an option, it is important to teach keyboarding, either with a standard or an adapted keyboard

FIGURE 13–8
Illustration of Using Dot-to-Dot Prompts to Teach Handwriting Skills

Photo: Susan Copeland

(Foley & Staples, 2007). Some experts recommend teaching both handwriting and keyboarding because in today's world students will likely need skills in both areas (Foley & Staples, 2007).

Students Whose First Language Is Not English

Because more students from linguistically diverse backgrounds are enrolled in schools, it is important for teachers to understand how students acquire a second language and how that process affects literacy learning. The process of second language acquisition in children with moderate or severe disabilities has not been thoroughly studied (Verhoeven & Vermeer, 2006), probably because of low expectations for literacy development in these students. Nonetheless, teachers must pay close attention to the language learning of English Language Learner (ELL) students with more severe disabilities. It is easy to mistake second language learning difficulties for other learning problems and thus miss opportunities to provide effective language instruction. de Valenzuela and Tracey (2007) recommend that students receive a thorough assessment of their native language abilities by a competent bilingual specialist who has expertise in first and second language development and knowledge of the learning characteristics of students with severe disabilities. This information can then be used to build an appropriate literacy instructional program for these students. In general, ELL students do best when instructed in early reading skills (e.g., phonological awareness) in their home language first, before receiving literacy instruction in English. The scant research on literacy instruction of ELL students with severe disabilities makes this an area in need of additional research.

MATH INSTRUCTION

Like literacy, math is considered to be a critical area of knowledge for all individuals in today's society. The math curriculum includes a number of domains, including numeracy and computation, money and consumer skills, and time and time management.

Numeracy and Computation

Research suggests that many students with severe disabilities are able to learn complex math skills when provided with systematic instruction and support (Browder, Spooner, Algrim-Delzell, Harris, & Wakeman, 2008). Several comprehensive curriculums for teaching math concepts and operations to students with severe disabilities have been developed (e.g., Ford et al., 1989; Resnick, Wang, & Kaplan, 1973). In addition, the Common Core State Standards developed by the National Governors Association Center for Best Practices and the Council for Chief State School Officers provide a detailed listing of concepts and skills that students must master to complete basic math operations (**www.corestandards.org/Math/**). This section presents strategies that teachers can use to teach key math skills, including counting and numerals, basic concepts and operations, money and consumer skills, and time and time management.

Counting and Numerals

Many students with severe disabilities can be taught to count and to identify and understand the values of numerals (Browder et al., 2008). The ability to count objects requires four types of counting. Students must (a) *rote count* (e.g., count from 1 to 10); (b) *rational count* (e.g., count how many pencils you have), which requires an understanding of one-to-one correspondence and the ability to count concrete moveable objects, fixed ordered objects (e.g., a line of boxes on a worksheet), and fixed unordered objects (e.g., a group of boxes randomly placed on a worksheet); (c) *count from a number to a number* (e.g., count from 6 to 10); and (d)

skip count (e.g., count by fives to 30). Students also need to be able to use numerals and understand their values. This includes skills such as being able to identify a numeral from an array (e.g., "Point to 5"); match a numeral to an appropriate set of objects (e.g., matches the number 5 to the set with five objects in it); and write numerals when given a verbal cue (e.g., "Write the number 5"). The ability to count and use numerals are essential prerequisite skills to learning more complex math concepts, such as *more* and *less,* and the ability to complete basic operations such as addition and subtraction.

Several strategies have been shown to be effective in teaching these counting and numeral skills: response prompting and fading procedures, chaining, differential reinforcement, and systematic error correction (Browder et al., 2008). For example, Fredericks and colleagues (1976) recommended the use of verbal modeling and backward chaining to teach students to count from 1 to 10. Instruction begins with the teacher providing an instructional cue, "Let's count from 1 to 10." The teacher then models each number in the sequence 1 to 10 for the student. Once the student imitates the teacher's model for all of the numbers from 1 to 10, a backward-chaining procedure is used to establish independent counting by the student. For example, the teacher would model the counting sequence from 1 to 9 and then provide the student with the opportunity to say the number 10. The teacher would provide differential reinforcement for correct responses and systematically correct the error if the student did not say 10. Once the student was able to say the number 10 without prompting, then the teacher would only provide models through the number 8 and the student would be expected to count the numbers 9 and 10. This procedure would continue until the student was able to count from 1 to 10 independently. Similar procedures can be used to teach other forms of counting and to teach students to identify numerals and state their values.

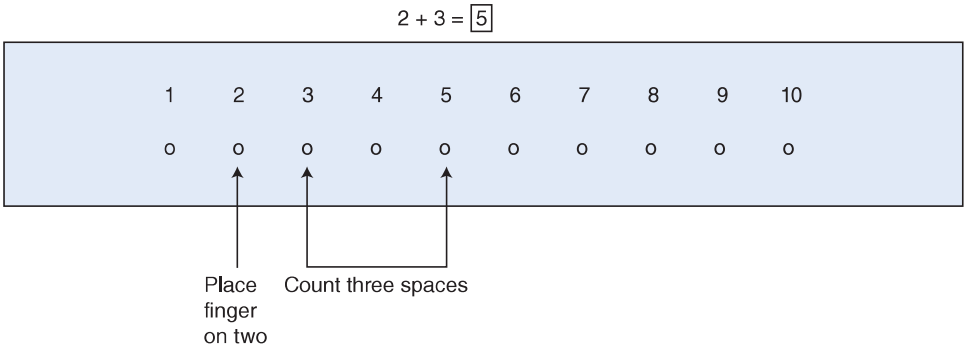
Computation

Once students have mastered the necessary prerequisite skills, they can move on to learning basic mathematical operations, including addition and subtraction. A number of strategies have been recommended for teaching these skills to students with severe disabilities.

Manipulatives. Students can learn to do addition and subtraction through the use of concrete objects that can be grouped into discrete sets (Flexer, 1989). For example, a student might be presented with the written equation (2 + 3 = ___) and a group of 10 small blocks. To complete the problem, the student would read the equation (i.e., "2 plus 3 equals"), then place two blocks together in a set, place three blocks together in another set, count the two sets of blocks, write the sum next to the equal sign, and finally read the complete equation (i.e., "2 plus 3 equals 5"). Manipulatives can also be used to teach subtraction using similar procedures. The student would be presented with a written equation (5 – 2 = ___) and a group of 10 blocks. The student would read the equation (i.e., "5 minus 2 equals"), then count five blocks into a set, remove two blocks from the set, count the remaining blocks, write the remainder next to the equal sign, and then read the complete equation (i.e., "5 minus 2 equals 3").

Number Line. A number line can also be used to teach students addition and subtraction (Cihak & Foust, 2008). In this procedure, the student is presented with a written equation (2 + 3 = ___), he or she reads the equation (i.e., "2 plus 3 equals"), then the student would place his or her finger at 2 on the number line, count three more spaces on the number line, then write the number that he or she said last next to the equal sign, and then say the complete equation (i.e., "2 plus 3 equals 5"). Figure 13–9 illustrates the use of a number line to complete an addition problem. The procedure would simply be reversed to teach the student to complete subtraction problems.

FIGURE 13–9
Illustration of Addition Using a Number Line The student places his or her finger on the number line, designating the first number in the equation. Then he or she counts the number of spaces designated by the second number in the equation. Finally, he or she writes the number counted as the sum.

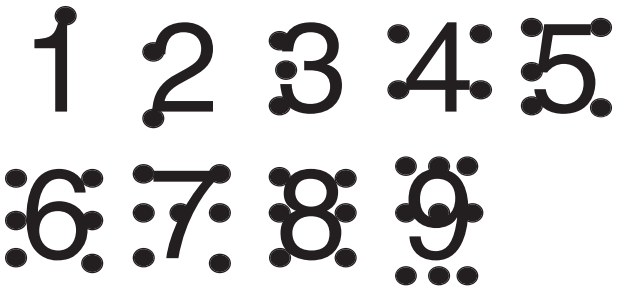


Touch Points. Another strategy for teaching addition and subtraction are touch points (Cihak & Foust, 2008). In 1989, Bullock, Pierce, and McClellan refined this strategy into a commercial curriculum called *TouchMath* that teaches addition, subtraction, multiplication, and division using touch points. In this approach, dots representing the value of each number from 1 to 9 are embedded within the numeral (see Figure 13–10). The student touches the dots once to count the value of each numeral. For example, for the equation 3 + 2 =, the student would count the dots embedded on the numeral 3 (i.e., one, two, three) and continue counting the dots on the numeral 2 (i.e., four, five) to arrive at the sum. Cihak and Foust (2008) taught three elementary students with autism to complete single-digit addition problems using either a number line or touch points. The results showed that two out of the three students learned addition using the number line and that all three students learned addition using touch points. Therefore, touch points was a superior strategy to the number line for all three students.

Mr. Garcia has implemented touch-point math with Marcus and is beginning to see some improvement in Marcus's addition and subtraction skills. Marcus has struggled to understand basic addition and subtraction so Mr. Garcia and Ms. Carter have used lots of manipulatives with him and now have begun teaching him a touch-point system. Using the concrete "points" on the numbers seems to provide the supports that he needs in order to be successful.

Calculators. Students with severe disabilities can also use calculators to complete addition and subtraction problems (Koller & Mullhern, 1977). Researchers have demon-

FIGURE 13–10
Illustration of Touch Points



(From "A rationale and procedure for teaching addition", by T. Kramer & D. A. Krug, 1973, *Education and Training of the Mentally Retarded,* 8, 140–144. Adapted with permission.)

strated that students can extend their use of calculators to the next dollar (i.e., the strategy) to purchase items in community settings or for budgeting skills (Frederick-Dugan, Test, & Varn, 1991).

The emphasis on the participation of students with severe disabilities in the general education curriculum has prompted researchers to begin to examine strategies that can be used to teach more complex mathematical concepts and operations to this group of students (Jimenez, Courtade, & Browder, 2008). Jimenez et al. taught three high school students with severe disabilities to compute the value of x in a standard algebraic equation (e.g., $5 + x = 15$). The researchers used concrete representations (i.e., spoons, pens, paper clips), a number line, a task analysis of the calculation steps, and a constant time-delay procedure to teach the students to complete the equations. The results showed that two out of the three students learned all of the steps of the task analysis and one was able to master eight out of the nine steps of the task analysis before the end of the study. The two students who learned to complete all of the steps of the task analysis were able to generalize the procedure across materials and maintained the application of the procedure on follow-up probes.

Although the emerging research on teaching complex mathematical concepts and operations to students is positive, much more study is needed to determine the best approaches for teaching these skills to students. Equally important, research is needed to demonstrate how these concepts and skills can be integrated into students' daily routines and activities, and the impact that mastering these skills has on improving their quality of life.

Money and Consumer Skills

Being able to use and manage money are essential skills for successful community living. While developing basic math skills like adding and subtracting can enhance the ability of students to use and manage money, research suggests that even students without these skills can learn to use money to purchase goods and services, manage bank accounts, and use a budget in order to meet their immediate financial needs (Browder & Grasso, 1999; Xin, Grasso, Dipipi-Hoy, & Jitendra, 2005). In the following sections, we discuss strategies for teaching counting money, purchasing skills, and banking and consumer skills.

Counting Money. Historically, the general sequence for teaching money counting began with teaching students to count coins and then to count bills (see Table 13–1).

TABLE 13-1

Sequence to Teaching Money Counting

1. Count pennies to 10 cents (count by ones to 10).
2. Equate 10 pennies to one dime (both are 10 cents).
3. Count dimes to $1 (count by 10s).
4. Count quarters to $1 (count by 25s).
5. Equate two quarters plus dimes to $1 (count by 10s, beginning with 50).
6. Count nickels to $1 (count by fives).
7. Count quarters plus nickels (count by fives, beginning with 25, 50, 75).
8. Count dimes plus nickels (count by 10s and switch to counting by 5s).
9. Count quarters plus dimes (count by fives, beginning with 25, 50, 75).
10. Count quarters, dimes, and nickels (count 25, 50, or 75, then by 10s, and then by 5s).
11. Count $1 bills to $10.
12. Count $5 and $1 bills to $20.
13. Count $10 and $1 bills to $20.
14. Count $10, $5, and $1 bills to $20.
15. Use a calculator to compute the affordability of multiple purchases.

TABLE 13-2
A Dollar-First Sequence for Teaching Money Skills

1. *$1 bill.* Use of $1 bill for small purchases (change can be saved in a personal bank at home and converted to dollars by caregivers).
2. *One to ten $1 bills.* Use of $1 bills needed for purchases up to $10 by the "one-more-than" strategy (e.g., $5.49, give five $1 bills and one more).
3. *$10 bill.* Use of $10 bills for large purchases. Use a number line of "one-more-ten-than" strategy (e.g., for $36.59, give three $10 bills and one more $10 bill).
4. *Mixed $10 and $1 bills.* Student learns to count up to "one-more-than" using first 10s, then 1s (e.g., $36.59, give three $10 bills, six $1 bills, and one more dollar bill).
5. *Equivalence.* Students learn to use equivalent bills (e.g., $5 bill = five $1 bills; two $5 bills = $10 bill or ten $1 bills).
6. *Coins.* Teach coin counting once the use of bills is mastered. Teach counting by fives, beginning with nickels, following the strategy developed by Lowe and Cuvo (1976).

(From *Instruction of students with severe disabilities* (5th ed.), by M. E. Snell and F. Brown, 2000, Upper Saddle River, NJ: Merrill.)

This sequence is based on curricula for students without disabilities who typically begin with coin identification in kindergarten and move toward counting coin and bill combinations and giving change back from a purchase by third grade. This sequence is appropriate for young children, but it may not always be the most functional for older students, who lack basic counting and numeracy skills. In some cases, it may be more appropriate to teach students to count bills first in order to give students a strategy with which to participate more fully in community settings. Browder and Snell (2000) recommended an alternate sequence in teaching money counting to older students (see Table 13–2).

Research suggests that many students with severe disabilities can learn to count coins with explicit instruction (Browder et al., 2008; Xin et al., 2005). The procedures for teaching coin counting rely on the use of response-prompting and fading procedures, differential reinforcement, and systematic error correction (Bellamy & Buttars, 1975; Lowe & Cuvo, 1976). Lowe and Cuvo taught students to tap coins in order to help them remember their value (e.g., quarter = 5 taps, dime = 2 taps, nickel = 1 tap). Students would count by fives in sequence for each time they tapped the coin. The procedure began with the student organizing the coins from the largest to the smallest (e.g., quarter, dime, nickel, penny). Then he or she would begin to count by tapping and counting with the largest coin in the set. Pennies were counted last by having the student count from the last value they said by ones. For example, if a student was counting a dime, nickel, and three pennies he or she would begin with the dime tapping it twice and counting (i.e., 5, 10), then counting the nickel by tapping it once (i.e., 15), and then he or she would count the three pennies (i.e., 16, 17, 18). A similar strategy is to have the student use finger prompts to represent the values of the larger coins (e.g., quarter = 5 fingers; dime = 2 fingers; nickel = 1 finger).

Some students may not be able to master the counting and numeracy skills needed to successfully count coins. In this situation, it may be appropriate to identify an alternate performance strategy that would allow the student to be able to use money to buy goods and services. For example, research studies have examined the viability of strategies such as teaching students to obtain the amount of money needed to complete an activity before they do the activity (McDonnell, 1987) or the use of coin cards (Browder et al., 1988). Figure 13–11 illustrates a coin card that a student could use to purchase a soda from a vending machine.

The use of systematic instructional procedures is also necessary to effectively teach students to count bills. When students do not have the necessary prerequisite skills, IEP teams may need to consider alternatives such as taking a large bill (e.g.,

FIGURE 13–11
Illustration of a Coin Card The student would match coins to the pictures of the quarters and then use the coins to purchase a drink from the vending machine. The student could match coins either before or after going to the vending machine.

$1 1.00

$20 bill) to purchase goods or services (Morse & Schuster, 2000) or the use of the next-dollar or one-more-than strategy (Colyer & Collins, 1996; McDonnell, Horner, & Williams, 1984). The next-dollar or one-more-than strategy is designed for students who may have some counting and numeracy skills, but may not have the ability to count complex combinations of bills and coins. The student is taught to identify the dollar value on the cash register and/or cashier's request and then count out the next highest dollar value. McDonnell et al. (1984) taught students to say the dollar value shown on the cash register, say the next number, and then count out that number of $1 bills. So, if the price on a register was $5.67, the student would say "five," then say "six," and then he or she would count out six $1 bills. The same procedure could be used to teach students to use bill combinations such as a single $5 bill and a single $1 bill. In a different variation of the strategy, Colyer and Collins (1996) taught students to count out the number of bills required for the dollar amount and one more for the cents. Using the above example, the student would count out five $1 bills and then say "one more for cents," giving the cashier one more $1 bill.

Purchasing Skills. As discussed earlier, students with severe disabilities often have significant difficulty using the skills learned at school in actual performance settings (McDonnell, 2010). Consequently, students may learn to count money proficiently at school, but may not be able to use these skills in order to purchase goods and services in stores, restaurants, or theaters.

Initial attempts to promote the generalization of money skills to community settings often focused on the use of classroom or school-based simulations (McDonnell, 2010). *Simulations* are training formats in which the natural stimuli found in the performance environment are represented through some alternate form or medium during instruction. Unfortunately, early studies on the use of simulations in order to promote generalization of money skills to actual performance settings had mixed outcomes for students. For example, McDonnell et al. (1984) taught students to use the next-dollar strategy using paper flash cards and photographic slides of cash registers to represent amounts. However, the results showed that neither the flash card nor the slides resulted in the students' generalized use of the next-dollar strategy to grocery stores. Only after pairing slide instruction with community-based instruction did the students' performance improve. Other studies found similar results, which reinforced the need for students to be provided community-based instruction in order to improve their generalized performance of money skills (Branham, Collins, Schuster, & Kleinert, 1999; Browder et al., 1988; McDonnell & Horner, 1985). In addition, these studies suggested that the level of generalization demonstrated by students was better if

simulations were designed to approximate as closely as possible the stimulus conditions found at actual performance sites.

Recent improvements in computer and video technology have enhanced the ability of teachers to represent the actual stimuli found in community settings at school. Several recent studies have shown that computer- and video-based instruction can improve students' ability to acquire generalized purchasing skills (Ayres, Langone, Boon, & Norman, 2006; Cihak et al., 2004; Hansen & Morgan, 2008). For example, Hansen and Morgan (2008) use computer-based instruction consisting of DVD videos and CD-ROM screens to teach students with severe disabilities to go to the check-out area, stand in the shortest line, place items on the conveyer belt, pay for the items using the next-dollar strategy, respond to the request for "paper or plastic," and obtain the change. The students were able to master the skills using computer-based instruction, but more importantly, they were able to generalize the skills to three stores in the community.

Marcus's parents recently talked to Ms. Carter because they would like Marcus to be able to independently buy a snack or make a small purchase when the family goes out into the community. Because Marcus is still working on basic math skills, Ms. Carter decided to teach Marcus the next-dollar strategy in order to make small purchases and wait to teach making change until he has a stronger understanding of basic math skills. They practiced everyday in the classroom during the math block using simulated activities. She and Marcus would use ads in the newspaper circular to select an item and then count out to the next dollar in order to pay for it. She also asked Marcus's parents to send money each week so that Marcus could practice the strategy while making an actual purchase. He went to the school store run by the PTA and bought small items. She then taught Marcus's mom and dad how to use the strategy and had them practice each weekend with Marcus when the family did their weekly shopping or family fun outings. After a few weeks, Marcus's family reported that he can now buy snacks by himself at the movie theater and at the local arcade.

Consumer and Money Management Skills. Students with severe disabilities can learn a wide variety of consumer and money management skills, including using a calculator to determine whether they have enough money to purchase desired items (Frederick-Dugan et al., 1991), writing checks and deposit slips (Davies, Stock, & Wehmeyer, 2003), using an ATM (Cihak et al., 2004), and developing budgets (Wilson, Cuvo, & Davis, 1986).

Mr. Karst is working with Ms. Davis, Jacob's adult roles and financial literacy teacher, to help him learn to use a personal financial program to develop and keep a budget. With support from his mom and dad, Jacob established budget categories and he is learning to enter the money he gets for doing chores around the house and to track his spending. The goal is to have Jacob become fluent in using the software before he gets a job, earns more money, and needs to manage more of his own expenses.

Computer technology is increasingly being used to support individuals with disabilities so that they may meet the demands of daily living, including managing their own finances in the future. For example, Davies and colleagues (2003) describe the results of an exploratory study that compared the effectiveness of a computer software program and use of a traditional check register to allow adults with intellectual disabilities to write checks, record checks, and maintain their checkbook balances. The software program used icons to represent various tasks (e.g., write check) and payees (e.g., a house to represent paying the rent). The results showed that the rate of errors made by the study participants was significantly lower when they used the computer software than when they completed the tasks using a traditional check register.

TABLE 13-3
Illustrative Sequence to Teaching Telling Time with an Analog Clock

1. Respond to a familiar hand position on a clock as a specific cue for an event (e.g., 11:35 = lunch).
2. Tell time by the hour.
3. Tell time at 30 minutes past the hour.
4. Tell time at 15 minutes past the hour.
5. Tell time at 15 minutes before the hour.
6. Tell time at 45 minutes past the hour.
7. Tell time at 5-minute intervals past the hour.
8. Tell time at 5-minute intervals before the hour.
9. Tell time to the minute.

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Time and Time Management

When students have the skills required to tell time and schedule their activities, they are less dependent on others in home, school, work, and community settings. Some of the most important skills are (a) knowing when an activity begins and ends, (b) being able to follow a daily schedule, and (c) being able to plan weekly and monthly schedules in order to accomplish the activities that are necessary for successful daily living.

Telling Time. The act of looking at a clock or a watch and determining that it is 2:36 seems relatively simple, but telling time is a very complex operation that requires students to use a large number of counting and numeracy skills. However, with systematic instruction, many students with severe disabilities can learn to tell time using both analog and digital clocks. Table 13–3 presents a typical sequence for learning to tell time using an analog clock (Ford et al., 1989). However, given the wide availability of digital clocks, watches, and other electronic devices with digital time displays (e.g., cell phones, computers), a student's IEP team should consider whether learning to tell time using an analog clock is actually the best option.

Developing and Following a Schedule. Learning to develop and follow a schedule can increase a student's ability to make choices and control his or her life. Students can learn to develop and follow daily and weekly schedules using a variety of formats, ranging from pictures and symbols (Bambara & Ager, 1992) to personal digital assistants (PDAs) (Davies, Stock, & Wehmeyer, 2002). It is also important to note that students do not necessarily need to tell time in order to use a scheduling system. This can be accomplished by developing a picture or symbol system that designates the time (either analog or digital representations) when the activity is supposed to occur. The student is taught to identify the specific activity that the picture or symbol represents (e.g., foods class) and is taught to match the time (e.g., 9:10) that the activity is supposed to occur with a clock face or digital clock. The schedule can be expanded to include self-management checklists that allow the student to gather the materials necessary for the activity (e.g., textbook, notebook, pencil) and/or to self-evaluate their performance in the activity (e.g., arrive to class on time, turned in homework assignment).

Jacob's mom and dad bought a new home computer this year. During Jacob's IEP meeting, his dad asked that Mr. Karst work with them to help Jacob learn to use Microsoft® Outlook® to develop a weekly schedule. Jacob and his parents came up with a list of household chores and leisure activities that Jacob would need to schedule on a regular basis. Mr. Karst is now teaching Jacob to use the calendar in Outlook® to set up his home schedule. Jacob begins with a list of known words that represent activities (e.g., trash, homework) that he has to get done each week and a list of activities that he can choose to do if he wants (e.g., computer game, go ice-skating). Jacob's mom and dad

came up with a set of guidelines that he can use to help him set up his schedule (e.g., how much time he needs to schedule in order to complete his homework and his chores, how much time he can watch TV and play on the computer, and when he needs to go to bed). Mr. Karst and Jacob's computer technology teacher have set up a teaching plan to help Jacob learn to use these rules to develop his weekly schedule.

In one of the earliest published studies on scheduling systems, Bambara and Ager (1992) taught three adults with severe disabilities to develop and follow a weekly leisure schedule. The study participants selected picture cards that represented specific activities that they wanted to complete, chose the day of the week on which they wanted to complete the activity, and placed the card into a schedule book. The participants were trained to follow the schedule during their typical daily routines. The results showed that all of the participants learned to self-schedule their leisure activities and follow the schedule without assistance, and they maintained use of the schedule system over time. Equally important, the use of the scheduling system resulted in an increase in the frequency and diversity of leisure activities completed by the participants each week.

SCIENCE INSTRUCTION

Science is one of the three areas of the general education curriculum that the NCLB Act and IDEA require that IEP teams address in developing a student's educational plan. Most state academic content standards are based on the National Science Education Standards developed by the National Research Council (1996). These standards address seven areas, including science as inquiry, physical science, life science, earth and space science, science and technology, science and social perspectives, and the history and nature of science.

Unfortunately, a limited amount of research has been conducted on approaches and strategies for teaching science content to students with severe disabilities (Courtade, Spooner, & Browder, 2007). Spooner, DiBiase, and Courtade-Little (2006) suggest that given the limited amount of research on teaching science content to students with severe disabilities, practitioners might do well to use the standards-referenced approach described above to look at how the functional skills that are important to a student's participation in home, school, work, and community settings can be aligned with science academic content standards. For example, teaching a student to read the weather report in the newspaper or from the web to predict the type of clothing that he or she needs to wear that day could be linked to a standard such as *"evaluate weather predictions based upon observational data"* (Utah State Office of Education, March, 2002). They assert that many functional skills are consistent with the principles laid out in the National Science Education Standards and could be justified legitimately as science content.

Some of the strategies that have been used to teach science concepts and skills to students have included the universal design of a science curriculum (Dymond et al., 2006), classwide peer tutoring (Utley, Reddy, Delquardi, Greenwood, & Mortweet, 2001), and embedded instruction (McDonnell, Johnson, Polychronis, & Riesen, 2002). Dymond et al. (2006) conducted a study that focused on the application of universal design principles to a high school science course. A team composed of the general education teacher, a special education teacher who also taught the science course to students with mild disabilities, and the special education teacher for students with developmental disabilities worked collaboratively to restructure each science lesson using universal design principles. The team met weekly throughout the semester to restructure the traditional lesson plans so that they were accessible by all students in the class, including those with severe disabilities. The results suggested that structuring the course to meet the needs of all students had a number of benefits for both

students with and without disabilities. For example, the researchers found that for students with disabilities, the process led to improved social interactions with their peers without disabilities and improved their participation in instructional routines and activities. The researchers noted positive outcomes for students without disabilities, including improved class participation; personal responsibility; and improved completion of work, grades, and end-of-year test scores.

LEARNING OUTCOME SUMMARIES

13.01 Selecting Academic Skills for Instruction

Learning Outcomes

1. Identify the factors that should be taken into account in selecting academic skills for instruction for students with severe disabilities.

Five general guidelines can be used to assist IEP teams to select appropriate academic skills for instruction. First, goals and objectives should build on the students' present level of symbol use by targeting the use of symbols in instruction or daily living, expanding their use of symbols, and/or teaching students to use more complex symbols. Second, goals and objectives should be designed to increase the student's use of symbols in home, school, and community activities. Third, goals and objectives should contribute to the student's long-term postschool goals. Fourth, the academic skills selected for instruction should reflect the student's grade level and chronological age. Finally, academic goals and objectives should enhance the students' capacity to participate fully in general education classes and their neighborhood school.

2. Describe the strategies that IEP teams can use to ensure that a student's goals and objectives align with the general education curriculum and meet his or her specific educational needs.

Academic goals and objectives can be developed using a standards-based approach, a standards-reference approach, and/or a functional approach. In the standards-based approach, IEP teams adapt or extend a grade-level standard so that it accommodates the student's learning needs and symbol use. The standard-referenced approach aligns academic skills that are identified through an ecological curriculum framework with a grade-level standard. The functional approach identifies academic content through an ecological curriculum framework that is critical to the student's performance in home, school, or community activities.

13.02 Determining the Instructional Approach

Learning Outcomes

Describe the approaches that can be used to teach academic skills to students with severe disabilities.

Academic skills can be taught within typical instruction routines and activities of the classroom. Several different strategies have proven to be effective in this approach including the universal design of lessons, cooperative learning, peer-mediated instruction, curriculum accommodations and modifications, student-directed learning, and embedded instruction.

Parallel instruction can also be an effective way to teach academic skills to students as well as strategies such as multilevel curriculum and instruction in which students receive instruction on different skills within the same curriculum domain as their peers, and curriculum overlapping in which the student is taught skills that are unique to his or her specific needs that fit within the instruction being provided to their peers.

13.03 Literacy Instruction

Learning Outcomes

1. Discuss the implications for literacy instruction created by definitions of literacy used by educators.

What educators believe about literacy influences their instructional decisions in the classroom. Definitions of literacy that are limited to conventional reading and writing of text may lead to excluding students with more severe disabilities from comprehensive, engaging literacy instruction.

2. Describe the components of comprehensive literacy instruction for students with moderate or severe disabilities.

Recent research findings demonstrate that students with moderate or severe disabilities often achieve higher literacy levels than was previously thought possible when provided with appropriate research-based instruction. Federal mandates such as IDEA (2004) and No Child Left Behind (NCLB) along with the adoption of the Common Core State Standards (CCSS) require that all students have access to the general curriculum and to high-quality academic instruction. It is no longer sufficient to provide only functional sight-word instruction for these students. Instead, students with moderate or severe disabilities should receive comprehensive literacy instruction that builds their language and communication abilities and develops their phonemic awareness, phonics, vocabulary, fluency, comprehension, and writing skills.

13.04 Math Instruction

Learning Outcomes

Identify the key areas of mathematics instruction for students with severe disabilities and describe the strategies that can be used to teach skills in each area.

The ability to count and use numerals is an essential prerequisite skill to more complex math skills. These skills can be taught using evidence-based instruction strategies such as response prompting and fading, chaining, differential reinforcement, and systematic error correction.

Once a student has mastered these skills, then he or she can move on to learning basic computational skills such as addition, subtraction, multiplication, and division. Addition and subtraction can be taught through the use of manipulatives, a number line, touch points, or by using a calculator. Other key areas of math, which are essential for successful community living, include money and consumer skills, and time and time management skills. Response prompting and fading, chaining, differential reinforcement, and systematic error correction have been shown to be effective in teaching these skills.

13.05 Science Instruction

Learning Outcomes

Describe some of the instructional approaches that have been used to teach science concepts and skills to students with severe disabilities.

Research on science instruction for students with severe disabilities is limited. However, it has been suggested that a standards-referenced approach to instruction that seeks to align functional skills important to a student's performance in home, school, and community settings with appropriate grade-level standards may be a suitable strategy to develop appropriate goals and objectives. Some of the strategies that have been used to teach science concepts and skills have included universal design of science curriculum, classwide peer tutoring, and embedded instruction.

SUGGESTED ACTIVITIES

1. Interview teachers in your school about what they consider literacy to be and compare these definitions with definitions found in the scholarly literature. What are the similarities and differences among these? What might be the implications of these for instruction?
2. Develop a literacy lesson for a student with severe disabilities that you have observed or taught. Include in the lesson each component area of effective literacy instruction. Describe the learning goal for the lesson, the materials (and modifications, if

needed) and learning activities, instructional strategies, and assessment tool you will use. If possible, implement the lesson and conduct the assessment. Examine the assessment data and reflect on how you will adjust the next literacy lesson for this student.

3. Review your state's academic content standards in mathematics at the second, fourth, and sixth grades. Identify the critical functions of each standard and then pinpoint one functional skill that could be used to allow the student to demonstrate progress toward mastery of each standard.
4. Describe how embedded instruction could be used in general education classes in order to help Jacob learn the key concepts and terms identified by his general education teachers for each unit.
5. Ms. Smith's first-grade class is working on the science standard that requires that students separate mixtures based on properties (e.g., by size or by substance [rocks and sand, iron filings and sand, salt and sand]). Create a lesson that teaches this standard and is adapted for Marisa, a child with autism, who has limited speech and uses the Picture Exchange Communication System (PECS) to communicate. For example, how could she participate in the lesson in a way that would help her gain an understanding of how to categorize items?